A

Mini Project-I Report

on

DIGITAL ELECTRONICS CALCULATOR

Submitted to

BHILAI INSTITUTE OF TECHNOLOGY, DURG

An Autonomous Institute

Affiliated to

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY

BHILAI(C.G.)

In partial fulfillment of the requirement for the award of

Bachelor of Technology

in

Computer Science and Engineering

By

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Under the Guidance of

Prof. Revati Raman Dewangan	**Prof. Usha Kiran**
Assistant Professor	**Assistant Professor**
Computer Sc .& Engg.	**Computer Sc. & Engg.**

DECLARATION BY THE CANDIDATE(s)

We the undersigned solemnly declare that the report of the project work entitled DIGITAL ELECTRONICS CALCULATOR, is based on my own work carried out during the course of my study under thesupervision of Prof. Revati Raman Dewangan and Prof. Usha Kiran.

We assert that the statements made and conclusions drawn are an outcome of the project work. We further declare that to the best of my knowledge and belief that the report does not contain any part of any work which has been submitted for the award of any other degree/diploma/certificate in this University/ any other University of India or any other country.

(Signature of Student)	(Signature of Student)	(Signature of Student)	(Signature of Student)
Name : Arjun Kushwaha	Name : Aman Gupta	Name : Aditya Singh Chauhan	Name : Dheeraj Patel
Roll No.: 67	Roll No.:60	Roll No.: 66	Roll No.:65
Semester.: 3rd	Semester.: 3rd	Semester.:3rd	Semester : 3rd
Enrollment No.: BJ2446	Enrollment No.:CC1594	Enrollment No.: BJ6003	Enrollment No.: CA033

CERTIFICATE

This is to Certify that the report of the project submitted is an outcome of the project work entitled DIGITAL ELECTRONICS CALCULATOR carried out by **ARJUN KUSHWAHA bearing Roll No. 67 , Enrollment No. BJ2446 ; AMAN GUPTA bearing Roll No. 60, Enrollment No. CC1594; ADITYA SINGH CHAUHAN bearing Roll No. 66 , Enrollment No. BJ6003; DHEERAJ PATEL bearing Roll No. 65 , Enrollment No. CA033.**

Under my guidance and supervision in partial fulfillment of Bachelor of Technology in Computer Science from Bhilai Institute of Technology, Durg, an autonomous institute affiliated to Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G).

To the best of my knowledge and belief the project

i)   Embodies the work of the candidate himself / herself,

ii)   Has duly been completed,

iii) Fulfills the requirement of the Ordinance relating to the B. Tech. degree of the University,

iv)   Is up to the desired standard for the purpose of which is submitted.

Signature of Guide   **Signature of Guide**

Prof. Revati Raman Dewangan   **Prof. Usha Kiran**

Assistant Professor   **Assistant Professor**

Computer Sc. & Engg.   **Computer Sc. & Engg.**

The Project work as mentioned above is hereby being recommended and forwarded for examination and evaluation.

Dr. (Mrs,) Sunita Soni

Head of the Department

Computer Sc. & Engg.

CERTIFICATE BY THE EXAMINERS

This is to Certify that the project the entitled

PROJECT TITLE : <u>DIGITAL ELECTRONICS CALCULATOR</u>

Submitted by

Name: ARJUN KUSHWAHA Enrollment No: BJ2446 Roll No: Semester: 3rd
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Have been examined by the undersigned as a part of the examination for the award of Bachelor of Technology degree in Computer Science and Engineering from Bhilai Institute of Technology, Durg, an autonomous institute affiliated to Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G)

(Internal Examiner)   **(External Examiner)**

Name: **Name:**

Date: **Date:**

ACKNOWLEDGEMENT

We have great pleasure in the submission of this project report entitled DIGITAL ELECTRONICS CALCULATOR in partial fulfillment the degree of Bachelor of Engineering (CSE). While submitting this Project report, We take this opportunity to thank those directly or indirectly related to project work.

We would like to thank our guide Prof. Revati Raman Dewangan and Prof. Usha Kiran. & who has provided the opportunity and organizing project for me. Without his active co-operation and guidance, it would have become very difficult to complete task in time.

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While Submission of the project, I also like to thanks to Prof. Revati Raman Dewangan and Prof. Usha Kiran. **Project Coordinator,** faculties and all the staff of department of Computer Science & Engineering, **Bhilai Institute of Technology, Durg** for their continuous help and guidance throughout the course of project.

Acknowledgement is due to our parents, family members, friends and all those persons who have helped us directly or indirectly in the successful completion of the project work.

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CHAPTER -1
INTRODUCTION

1.1 Problem Statement:

Problem Statement: Digital Electronics Conversion Calculator

1.2 Overview:

In the field of digital electronics, understanding and working with different number systems and conversions are fundamental skills. As students delve into the complexities of digital circuits and systems, they often encounter challenges when converting between binary, decimal, octal, and hexadecimal number systems. To facilitate and enhance the learning experience, the need for a Digital Electronics Conversion Calculator has arisen.

1.3 Problem Description:

Students studying digital electronics frequently engage in tasks that involve converting numbers between various bases, such as binary, decimal, octal, and hexadecimal. The existing methods, often relying on manual calculations or generic calculators, may lead to errors and hinder the learning process. A dedicated Digital Electronics Conversion Calculator is required to provide a user-friendly and accurate tool for students to perform conversions seamlessly.

1.4 Objectives:

1. **User-Friendly Interface:** Develop an intuitive and easy-to-use interface suitable for students with minimal digital electronics background.

2. **Base Conversion Support:** Implement robust algorithms for converting numbers between binary, decimal, octal, and hexadecimal bases.

3. **Real-Time Updates:** Ensure real-time updates as users input values, offering instant conversion results.

4. **Educational Features:** Include educational features that explain the conversion process step by step, aiding in the understanding of the underlying concepts.

5. **Error Handling:** Implement error handling mechanisms to alert users of invalid inputs and guide them in correcting errors.

6. **History and Recall:** Incorporate a feature that allows users to view and recall their previous conversions for reference and review.

1.4 Significance:

The Digital Electronics Conversion Calculator aims to address the challenges faced by students in accurately converting between different number systems. By providing a user-friendly and educational tool, this project aims to enhance the learning experience, reduce errors, and foster a deeper understanding of digital electronics concepts.

1.5 Scope:

The scope of the project encompasses the development of a standalone Digital Electronics Conversion Calculator application, accessible on various platforms (desktop, web, or mobile). The calculator should cater to the specific needs of students studying digital electronics at various educational levels.

1.6 Deliverables:

1. Fully functional Digital Electronics Conversion Calculator application.
2. User documentation explaining the features and usage of the calculator.
3. Educational content integrated into the application to aid in understanding conversion processes.
4. A report detailing the development process, challenges faced, and lessons learned.

1.7 Constraints:

1. The project should be completed within a specified timeframe (to be determined).
2. The calculator should be compatible with commonly used platforms and devices.
3. The user interface should be designed keeping in mind the target audience's proficiency in digital electronics concepts.

1.8 Success Criteria:

The success of the Digital Electronics Conversion Calculator will be evaluated based on its functionality, user-friendliness, educational value, and adherence to the specified constraints. The project's success will be measured through user feedback and its effectiveness in aiding students in mastering digital electronics conversions.

CHAPTER -2
Hardware and Software Requirement

To develop a web-based digital electronic calculator for your project, you'll need both hardware and software components. Here's a breakdown of the requirements:

2.1 Hardware Requirements:
2.2 Computer:

You'll need a computer to develop the web-based calculator. This can be a desktop, laptop, or even a tablet with a keyboard, depending on your preference.

2.3 Internet Connection:

Since you're developing a web-based application, you'll need a stable internet connection for accessing online resources, libraries, and testing your application in a browser.

2.1.1 Software Requirements:

2.1.2 Text Editor or Integrated Development Environment (IDE):

You'll need a text editor or IDE to write your code. Popular choices include Visual Studio Code, Sublime Text, Atom, or JetBrains WebStorm.

2.1.3 Web Browser:

You'll need a web browser for testing your web application during development. Commonly used browsers include Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge.

2.1.4 Programming Languages:

You'll typically use HTML, CSS, and JavaScript for building a web- based calculator.

- HTML: For creating the structure of your calculator interface.
- CSS: For styling the calculator interface.
- JavaScript: For implementing the calculator's logic and functionality.

2.1.5 Version Control (Optional but Recommended):

Using version control software like Git along with a platform like GitHub or GitLab can help you manage your project's codebase, collaborate with others, and keep track of changes.

2.1.6Calculator Design Tools (Optional):

You may use design tools like Adobe XD, Figma, Sketch, or even simple pen and paper to sketch out the user interface (UI) and plan the layout of your calculator before implementing it in code.

2.2.1 Additional Considerations:

2.2.2 Responsive Design:

Ensure that your web-based calculator is responsive, meaning it adjusts its layout and functionality based on the screen size and device orientation to provide a consistent user experience across different devices.

2.2.3 Accessibility:

Consider accessibility features such as keyboard navigation and screen reader compatibility to ensure that your calculator is usable by people with disabilities.

2.2.4 Testing Tools:

Utilize testing frameworks and tools to ensure the correctness and reliability of your calculator's functionality. Tools like Jest, Mocha, or Jasmine can be used for unit testing JavaScript code.

2.2.5 Deployment:

Decide on how you'll deploy your web-based calculator. You might deploy it on a web hosting service like GitHub Pages, Netlify, Vercel, or Heroku.

By fulfilling these hardware and software requirements, you should be well- equipped to develop a web-based digital electronic calculator for your project.

CHAPTER-3
Methodology

3.1Agile Development Methodology:

Agile methodologies like Scrum or Kanban can be beneficial for iterative development, allowing you to continuously improve and adapt your calculator based on user feedback.

3.2Waterfall Model:

Alternatively, you can follow a more traditional waterfall model, proceeding through distinct phases of development such as requirements gathering, design, implementation, testing, and deployment.

3.1.0Methods:

3.1.1 Requirement Gathering: Gather requirements from stakeholders to understand the functionalities and features they expect from the calculator.

3.1.2 Design: Design the user interface (UI) of the calculator using wireframing tools or by sketching on paper.

3.1.3 Frontend Development: Implement the calculator's UI using HTML, CSS, and JavaScript.

3.1.4 Backend Development (Optional): If your calculator requires server-side processing or storage, you may need to develop a backend using technologies such as Node.js, Python (with Flask or Django), Ruby on Rails, etc.

3.1.5 Testing: Perform unit testing, integration testing, and user acceptance testing (UAT) to ensure the calculator functions correctly and meets user requirements.

3.1.6 Deployment: Deploy the calculator on a web server or a cloud platform to make it accessible to users.

3.1.7 Maintenance and Updates: Continuously monitor the calculator for issues and release updates to improve functionality, fix bugs, or add new features based on user feedback.

CHAPTER -4
Materials:

4.1.1 Computers:

Required for development and testing purposes.

4.1.2 Internet Connection:

Essential for accessing online resources, libraries, and deploying the calculator.

4.1.3 Text Editor or IDE:
Tools like Visual Studio Code, Sublime Text, or JetBrains WebStorm for writing code.

4.1.4 Web Browsers:
Google Chrome, Mozilla Firefox, Safari, Microsoft Edge, etc., for testing the calculator.

4.1.5 Programming Languages:
HTML, CSS, JavaScript, and potentially backend languages if server-side processing is needed.

4.1.6 Version Control System:
Git along with platforms like GitHub or GitLab for managing the project's codebase.

4.1.7 Design Tools:

Adobe XD, Figma, Sketch, or pen and paper for designing the UI.

4.1.8 Testing Frameworks:
Jest, Mocha, Jasmine, etc., for testing code reliability and functionality.

4.1.7 Web Hosting Service:

GitHub Pages, Netlify, Vercel, Heroku, etc., for deploying the calculator online.

CHAPTER - 5
Conclusion & Scope of further work

5.0 Summary of Achievements:

Recap the main objectives of the project and summarize the accomplishments in developing the web- based digital electronic calculator.

5.1   Functionality Assessment:

Highlight the successful implementation of core functionalities such as basic arithmetic operations, memory functions, and any additional features added to enhance user experience.

5.2 User Interface Design:

Discuss the effectiveness of the user interface design, emphasizing its simplicity, intuitiveness, and responsiveness across different devices and screen sizes.

5.3 Performance Evaluation:

Summarize the performance metrics obtained during testing, including loading time, response time, compatibility with various web browsers, and accuracy of calculations.

5.4   User Feedback Incorporation:

Mention how user feedback was collected and integrated into the development process, resulting in improvements to the calculator's functionality and usability.

5.5   Overall Impact and Significance:
Reflect on the significance of the web-based calculator in addressing the needs of users, whether in educational, professional, or personal contexts, and its potential to streamline daily tasks and facilitate mathematical computations.

Scope of Further Work:

5.1.1 Enhanced Functionality:

Explore opportunities to add advanced mathematical functions, unit conversions, graph plotting capabilities, or support for complex calculations to make the calculator more versatile and comprehensive.

5.1.2   Accessibility Improvements:

Investigate ways to enhance accessibility features, such as keyboard navigation.

5.1.3   Localization and Internationalization:

Consider implementing language localization and internationalization features to make the calculator accessible to users worldwide, supporting multiple languages and cultural preferences.

5.1.4   Mobile Application Development:

Extend the project scope by developing a dedicated mobile application version of the calculator, optimized for smartphones and tablets, with additional features tailored for mobile users.

5.1.5   Integration with External Systems:

Explore possibilities for integrating the calculator with external systems or APIs (Application Programming Interfaces) to access real-time data, financial information, or scientific databases for enhanced functionality.

5.1.6   Security and Privacy Enhancements:

Implement robust security measures to protect user data and ensure secure communication between the calculator and external services, adhering to best practices for data privacy and confidentiality.

5.1.7   User Education and Documentation:

Develop comprehensive user documentation, tutorials, and educational resources to help users understand the features and capabilities of the calculator, promoting its adoption and usage.

5.1.8   Long-Term Maintenance and Support:

Establish a plan for long-term maintenance and support of the calculator, including regular updates, bug fixes, and compatibility checks to ensure continued reliability and usability.

By outlining the conclusion and scope of further work in your project report, you can provide a clear roadmap for future development efforts and highlight the potential for ongoing enhancements to the web-based digital electronic calculator.